

What is claimed is:

1. An isolated and purified superantigen  
toxin DNA fragment which has been altered such that  
5 binding of the encoded altered toxin to either the MHC  
class II or T cell antigen receptor is altered.

2. An isolated and purified DNA fragment  
according to claim 1, wherein said superantigen toxin  
10 is toxic shock syndrome toxin-1 having the sequence of  
SEQ ID NO:11 or a portion thereof, or an allelic  
portion thereof

3. An isolated and purified DNA fragment  
15 according to claim 1, wherein said superantigen toxin  
is Staphylococcal enterotoxin C1 having the sequence  
of SEQ ID NO:13 or a portion thereof, or an allelic  
portion thereof.

4. An isolated and purified DNA fragment  
20 according to claim 1, wherein said superantigen toxin  
is Streptococcal pyrogenic exotoxin A having the  
sequence of SEQ ID NO:15 or a portion thereof, or an  
allelic portion thereof.

5. An isolated and purified DNA fragment  
25 according to claim 1, wherein said superantigen toxin  
is toxic shock syndrome toxin-1 having the sequence of  
SEQ ID NO:11 or a portion thereof, or an allelic  
30 portion thereof further comprising a mutation wherein  
said mutation results in a change in histidine 135 of  
said toxin from histidine to alanine.

6. An isolated and purified DNA fragment  
35 according to claim 1, wherein said superantigen is

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Streptococcal pyrogenic exotoxin A fused to  
Streptococcal pyrogenic exotoxin B, wherein said DNA  
has the sequence of SEQ ID NO:23.

- 5 7. An isolated and purified DNA fragment according to claim 2, wherein said fragment encodes the amino acid sequence of SEQ ID NO:12 or a portion thereof, or an allelic portion thereof.
- 10 8. An isolated and purified DNA fragment according to claim 3, wherein said fragment encodes the amino acid sequence of SEQ ID NO:14 or a portion thereof, or an allelic portion thereof.
- 15 9. An isolated and purified DNA fragment according to claim 4, wherein said fragment encodes the amino acid sequence of SEQ ID NO:16 or a portion thereof, or an allelic portion thereof.
- 20 10. An isolated and purified DNA fragment according to claim 6, wherein said fragment encodes the amino acid sequence of SEQ ID NO:27 or a portion thereof, or an allelic portion thereof.
- 25 11. A recombinant DNA construct comprising:  
(i) a vector, and  
(ii) an isolated and purified altered superantigen toxin DNA fragment according to claim 1.
- 30 12. A recombinant DNA construct according to claim 11, wherein said DNA fragment has the sequence according to SEQ ID NO:11 or a portion thereof, or an allelic portion thereof.

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20. A recombinant DNA construct according to claim 16 wherein said construct is pETTST30.

21. A recombinant DNA construct according to claim 17 wherein said construct is pETSEC45.

22. A recombinant DNA construct according to claim 18 wherein said construct is pETSPEA42.

23. A recombinant DNA construct according to claim 11, wherein said vector is an expression vector.

10 24. A host cell transformed with a recombinant DNA construct according to claim 11.

25. A host cell transformed with a recombinant construct according to claim 20.

15 26. A host cell transformed with a recombinant construct according to claim 21.

20 27. A host cell transformed with a recombinant construct according to claim 22.

28. A method for producing altered superantigen toxin comprising culturing the cells according to claim 24, under conditions such that said DNA fragment is expressed and said superantigen toxin is thereby produced, and isolating said superantigen toxin.

29. A method for producing altered superantigen toxin comprising culturing the cells according to claim 25, under conditions such that said DNA fragment is expressed and said superantigen toxin is thereby produced, and isolating said superantigen toxin.

31. A method for producing altered  
superantigen toxin comprising culturing the cells  
according to claim 27, under conditions such that said  
DNA fragment is expressed and said superantigen toxin  
is thereby produced, and isolating said superantigen  
toxin.

33. An isolated and purified superantigen toxin according to claim 32 wherein said toxin is staphylococcal toxin shock syndrome toxin-1.

25                    34. An isolated and purified superantigen  
toxin according to claim 32 wherein said toxin is  
staphylococcal enterotoxin C1.

35. An isolated and purified superantigen  
30 toxin according to claim 32 wherein said toxin is  
streptococcal pyrogenic exotoxin A.

36. An isolated and purified superantigen  
toxin according to claim 32 wherein said toxin is  
35 TSST-1.

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44. A method for the diagnosis of superantigen-associated bacterial infection comprising the steps of:

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bacterial infection with altered superantigen toxin;  
and

- (ii) detecting the presence or absence of a superantigen-associated bacterial infection by  
5 detecting the presence or absence of a complex formed between the altered superantigen toxin and antibodies specific therefor in the sample.

45. A method for the diagnosis of a  
10 superantigen toxin-associated bacterial infection according to claim 40 wherein the altered superantigen toxin is chosen from the group consisting of SpeA, SEB, SEA, TSST-1, SEC-1.

- 15 46. A superantigen toxin-associated infection diagnostic kit comprising an altered superantigen toxin according to claim 32 wherein said toxin is chosen from the group consisting of SpeA, SEB, SEA, TSST-1, and SEC-1, and ancillary reagents  
20 suitable for use in detecting the presence or absence of antibodies against superantigen toxin in a mammalian sample.

47. A vaccine comprising an altered  
25 superantigen toxin according to claim 32 effective for the production of antigenic and immunogenic response resulting in the protection of a mammal against superantigen-associated bacterial infection.

- 30 48. A vaccine according to claim 47 wherein said altered superantigen toxin is chosen from the group consisting of SpeA, SEB, SEA, TSST-1, and SEC-1.

5                    50. A vaccine according to claim 48 wherein  
said vaccine further comprises at least one other  
different altered superantigen toxin chosen from the  
group consisting of SpeA, SEB, SEA, TSST-1, and SEC-1.

20                    52. A multivalent vaccine according to claim  
51 further comprising an altered SpeA superantigen or  
peptide thereof fused to an altered SpeB superantigen  
or peptide thereof.

54. A therapeutic method for the treatment  
35 or amelioration of a superantigen-associated bacterial

infection, said method comprising administering to an individual in need of such treatment an effective amount of antibodies against altered superantigen toxins in a pharmaceutically acceptable dose in a pharmaceutically acceptable excipient.

55. A therapeutic method for the treatment or amelioration of a superantigen-associated bacterial infection, said method comprising administering to an individual in need of such treatment an effective amount of altered superantigen toxins from streptococcal and staphylococcal bacteria in order to inhibit adhesion of superantigen bacterial toxin to MHC class II or T cell receptors by competitive inhibition of these interactions in a pharmaceutically acceptable dose in a pharmaceutically acceptable excipient.

56. A therapeutic method for the treatment of diseases that may not be associated directly with superantigen toxins by causing specific nonresponsiveness of T cell subsets or by expanding or stimulating specific T cell subsets, in vivo or ex vivo by use of altered superantigen toxin.

57. Antisera isolated from individuals immunized with one or more altered TSST-1 superantigen toxin.

58. Antisera according to claim 57 wherein said altered superantigen toxin TSST-1 comprises TSST-1 wherein position 30 has been altered to arginine or alanine.

59. Antisera according to claim 57 wherein said altered superantigen toxin TSST-1 comprises TSST-

1 wherein position 30 has been altered to arginine or  
alanine and position 135 has been altered to alanine.

5                   70. An antibody according to claim 69  
wherein said SEC-1 comprises a change to lysine at  
position 45.

72. An antibody according to claim 71 wherein said SpeA comprises a change to alanine at position 42.

74. An antibody according to claim 71  
wherein said SpeA comprises a change to alanine at  
position 42 and is fused to an altered SpeB wherein  
said SpeB comprises a change to serine at position 47.

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